SONY

White paper

December 2012

Xperia™ E dual

C1605/1604

Note: Screen images are simulated.

Purpose of this document

Sony product White papers are intended to give an overview of a product and provide details in relevant areas of technology.

Document history

Version		
December 2012	First released version	Version 1
January 2013	Second released version	Version 2
March 2013	Third released version	Version 3

Sony Mobile Developer World

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Product overview

Xperia™ E dual – Expertly created for simplicity

Ready to make life a little easier? Xperia™ E dual has all the fancy features you'd expect from a smartphone - easy access to thousands of apps, a quality camera and a great music experience. And Xperia™ E dual also remembers why phones were made in the first place: phone calls are as easy as ever, and sound quality is enhanced with HD voice and noise cancellation. Try it. It'll become your new best friend in no time.

Stay on top of your data and battery usage

With Xperia™ E dual, there's no risk of starting off on the wrong foot. Just open the box, switch on the phone and follow the easy setup guide. You'll be up and running before you can say 'who needs a printed multilanguage instruction manual?'. Xperia™ E dual also has everything you need to remain in control. The data usage app helps you manage your costs and keeps your phone bill free from unwanted surprises. You'll be on top of battery drain too – just use the power management app.

First class basics

Xperia™ E dual doesn't compromise on essential functions. This smartphone makes simple phone calls even better. HD voice makes sure you make yourself heard, loud and clear. Calls from school yards and city streets are no problem either. The noise cancellation feature filters out the background sounds.

Music the way you want it

Easy listening isn't just a music genre. The "WALKMAN" app is all about ease of use – and great music. You create your own playlists in a snap. So you can spend your time listening to music, instead of trying to figure out how features and functions work. Can't get enough? Go further into Music Unlimited*, choose from millions of songs and in 3D surround sound. Crank it up with xLoud loudness enhancement, and get the sound mix just right with graphic equalisers.

Music Unlimited is a subscription service. Please refer to Terms Of Service for details of fees. Music Unlimited is not available in every market.

Make the most of it

Set your smartphone to work. On Google Play, you'll find apps for everything you can think of - and more. Stressful day at the office? Wind down with a movie on the bus home. View the flick on the crisp 3.5" display. If you get stuck in rush hour traffic, you probably won't complain. The long-lasting, removable battery has enough power to keep you entertained for hours.

Convenient call handling – dual SIM cards

The dual SIM cards are perfect when you want to separate work from play – and handle your calls in a cost-efficient way. You switch between SIM cards anytime with a simple touch. Or make the switch happen automatically: just preset which SIM card to use at specific times of the day. You can also customise each SIM card separately. How about a formal ring signal during office hours, and your favourite party-starter at night?

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PlayMemories Online*

Where are all your favourite shots? Spread out on Facebook, your phone and your computer? Now you can carry every picture with you, without storing them all in your phone. PlayMemories Online lets you collect all your photos and videos in one place, then relive memories wherever you are. See the perfect shot? Upload pictures automatically over Wi-Fi® from your phone camera to PlayMemories Online. Then view your photos on any device – tablet, phone, computer, or BRAVIA® TV.

* PlayMemories Online is not available in every market.

Music Unlimited*

We've got what you want to hear – millions and millions of songs on demand from Music Unlimited. Listen offline and with no annoying ads. Enjoy dozens of preset channels and easily sync with your own music collection. Get the most from your music with Music Unlimited – enjoy on your Xperia smartphone and all your favourite devices – PC, PS3, BRAVIA® TV etc.

* Music Unlimited is a subscription service. Please refer to Terms of Service for details of fees. Music Unlimited is not available in every market.

Signature features

The Sony Xperia™ E dual comes with a range of features as standard. Below is a summary of the key signature features.

Xperia™ Timescape™
Communication made easy
The Timescape™ application manages all your communication with one person in one place. You can effortlessly browse by category your Facebook™ and Twitter™ communications, as well as view your photos. Now everything is all together and in chronological order, so you don't have to open different applications to see what's going on.

Xperia™ Infinite button
Everything you want – from everywhere
Tap the infinite button in the Timescape™ application and smart filter each category of communication by person. For example, when viewing a text message from a friend in Timescape™, tap the infinite button to view a list of all chat messages with that friend.

Xperia™ Local connectivity
More control over your media
Using Xperia™ Local connectivity, you can exercise more control over how media files get transferred and stored. For example, you can select MTP mode to transfer files if you want to limit the risk of data corruption, or select MSC mode if you want to have more control over the data storage.

Xperia™ Home screen application
The place you call Home
Customise your Home screen with widgets, shortcuts, folders, themes, wallpaper and other items.
Where's best for you? Email top right? Music player bottom left? You decide. With four extensions to your Home screen, you've got plenty of space to put things where you want. Just remember to flick left or right to find them.

Facts – dimensions, weight, performance and networks

Operating system	Google™ Android™ 4.0 (Ice Cream Sandwich)
Processor	1 GHz Qualcomm Snapdragon™ MSM7227A
Size	113.5 x 61.8 x 11.0 mm
Weight	115.7 grams
Available colours	Black Gold
Main screen	
Colours	262,000 colour TFT
Resolution	320x480 pixels
Size (diagonal)	3.5 inches
Scratch resistant	Yes – PMMA
Input mechanisms	
Text input	On-screen QWERTY keyboard
Touch screen	Capacitive
Touch gesture	Yes – multi-touch, up to 2 fingers supported
Memory	
RAM	512 MB
Flash memory	Up to 4 GB*
Expansion slot	microSD™ card, up to 32 GB
Camera	
Camera resolution	3.2 MP
Digital zoom	4x
Video recording	Yes – VGA
Sensors	
Accelerometer	Yes
Proximity sensor	Yes

Networks	
C1605	UMTS HSPA 900 (Band VIII), 2100 (Band I) GSM GPRS/EDGE 850, 900, 1800, 1900
C1604	UMTS HSPA 850 (Band V), 1900 (Band II), 2100 (Band I) GSM GPRS/EDGE 850, 900, 1800, 1900

Data transfer speeds	
GSM GPRS	Up to 86 kbps (download and upload)
GSM EDGE	Up to 237 kbps (download and upload)
UMTS HSDPA cat 8 (download)	Up to 7.2 Mbps
UMTS HSUPA cat 6 (upload)	Up to 5.76 Mbps
Talk time (GSM)	Up to 6 hours 12 min**
Standby time (GSM)	Up to 368 hours**
Talk time (UMTS)	Up to 6 hours 18 min**
Standby time (UMTS)	Up to 379 hours**
Music listening time	Up to 33 hours on PHF mode**
Video playback time	Up to 8 hours**
Battery	1530 mAh typical 1500mAh minimum

Memory comprises approximately 650 MB of firmware, 750 MB of "Phone memory" for downloaded applications and 2 GB of "Internal storage" for music, pictures, movies and some application data. For a more detailed description of the different types of memory and how they are used, see "Memory in Android phones" on page 17.

*** Values are according to GSM Association Battery Life Measurement Technique as performed in controlled laboratory conditions. Actual time may vary.*

Note: Battery performance may vary depending on network conditions and configurations, and phone usage.

Note: Performance metrics were measured under laboratory conditions.

Categorised feature list

Camera
3.2 megapixel camera
4x digital zoom
Geotagging
Self-timer
Send to web
Touch capture
Video recording

Music
3D surround sound (VPT)
Album art
Bluetooth™ stereo (A2DP)
Manual equalizer
PlayNow™ service*
Music player
TrackID™ music recognition*
xLoud™ Experience

Internet
Bookmarks
Google Play™
Google™ search*
Google Voice™ Search*
Google Maps™ for mobile with
Street View and Latitude™*
NeoReader™ barcode scanner
Pan & zoom
Web browser (WebKit™)

Communication
Call list
Conference calls
Google Talk™ application
HD voice
Noise suppression
Speakerphone
Xperia™ Timescape™
Xperia™ with Facebook™

Messaging
Conversations
Email
Gmail™*
Handwriting recognition
Instant messaging
Multimedia messaging (MMS)
Predictive text input
Text messaging (SMS)

Design
Auto rotate
Gesture input
On-screen 12-key keyboard
On-screen QWERTY keyboard
Picture wallpaper
Touch screen
Voice input
Wallpaper animation

Entertainment
3D games
Media browser
Motion gaming
Music unlimited
Radio (FM radio with RDS)
Sony Entertainment Network*
Video streaming
YouTube™*

Organiser
Alarm clock
Airplane mode
Calculator
Calendar
Contacts
E-Manual
Infinite button
Notes
Setup wizard
Tasks
Xperia™ Gallery

Connectivity
3.5 mm audio jack (CTIA)
aGPS*
Bluetooth™ wireless technology
DLNA Certified®
Media Go™
Media Transfer Protocol support
Micro USB support
Native USB tethering
PC Companion
Synchronisation via Facebook™
Synchronisation via Google™
Synchronisation via Exchange
ActiveSync®
Synchronisation via SyncML™
USB High speed 2.0 support
USB mass storage
Wi-Fi®
Wi-Fi® Hotspot functionality

*This service is not available in all markets.

Technologies in detail

NOTE: The information outlined below is general, and levels of compliance to standards and specifications may vary between products and markets. For more information, contact Sony Mobile Developer World or your Sony contact person where applicable.

Device-to-device communications (local)

Bluetooth wireless technology

Bluetooth™ profiles supported	Advanced Audio Distribution Profile v1.2 Audio/Video Remote Control Profile v1.3 Handsfree Profile v1.5 Headset Profile v1.2 Object Push Profile v1.2 Phonebook Access Profile v1.0
Core version and supported core features	2.1+EDR
Connectable devices	Products which support at least one of the profiles above.

More information:

www.sonymobile.com/developer

www.bluetooth.com

Wi-Fi®

Supported standards	IEEE 802.11b/g/n and Wi-Fi®
Connectable devices	Wi-Fi® access points
Frequency band	2.4 GHz
Data transfer rate	Up to 72 Mbit/s
Security	WEP 64 bit WEP 128 bit TKIP CCMP (AES) Open Authentication Shared Authentication EAP-TLS EAP-TTLS/MSCHAPv2 EAP-SIM PEAPv0/EAP-MSCHAPv2 PEAPv1/EAP-GTC WPA Personal and WPA2 Personal WPA Enterprise and WPA2 Enterprise
Encryption	WEP, TKIP and AES
Power save	WMM-UAPSD

Messaging

MMS (Multimedia Messaging Service)
According to OMA Multimedia Messaging Service v1.0 + SMIL

Email

Bearer type (IP)	GPRS, EGPRS, UMTS, Wi-Fi®
Character sets	BIG5 Traditional Chinese GB2312 Simplified Chinese GB18030 ISO-2022-JP Japanese ISO-8859-1 ISO-8859-2 Eastern Europe ISO-8859-5 Cyrillic ISO-8859-7 Greek ISO-8859-9 Turkish ISO 8859-11 KOI8-R Cyrillic Shift_JIS Japanese USASCII UTF-16 UTF-8 Windows® 874 Windows® 1251 Cyrillic Windows® 1252 Windows® 1254 Turkish Windows® 1258 Vietnamese
Protocols	POP3 and IMAP4
Push email	Microsoft® Exchange ActiveSync® (EAS)
Secure email	SSL/TLS, both port methods (POPS/IMAPS) and START-TLS
HTML mail	Yes (read only)

More information:

www.sonymobile.com/developer

www.openmobilealliance.org

Positioning – location based services

Supported standards:

- OMA Secure User Plane Location (SUPL)

- 3GPP™ Control Plane location (including Emergency location) – only supports E911

- Qualcomm® GPSOneXtra

Supported satellite systems:

- GPS

Provisioning (OMA CP)

OMA CP version 1.1

Multimedia (audio, image and video)

Audio Playback	Decoder format	Supported in file format
	Audio decoding MPEG-1/2/2.5, audio layer 3	MP3 (.mp3), 3GPP (.3gp), MP4 (.mp4, .m4a)
	AAC, AAC+, eAAC+	3GPP (.3gp), MP4 (.mp4)
	AMR-NB, AMR-WB	3GPP (.3gp), MP4 (.mp4)
	General MIDI (GM)	SMF (.mid)
	Linear PCM 16bit	WAV (.wav)
	OTA	OTA (.ota)
	vorbis	Ogg (.ogg)
Audio Recording	**Encoder format**	**Supported in file format**
	AMR-NB, AMR-WB	3GPP (.3gp), MP4 (.mp4), AMR (.amr)
	AMR-NB, AMR-WB, AAC-LC stereo Sample rate: 48 kHz Bit rate: 128 kbps	3GPP (.3gp), MP4 (.mp4)
Image Playback	**Decoder format**	**Supported in file format**
	1, 4, 8, 16, 24 and 32 bpp and RLE encoded formats	BMP (.bmp)
	Single and multi frame, bitmap mask support (GIF87a format and GIF89a format)	GIF (.gif)
	Joint Photographic Experts Group	JPEG (.jpg)
	Portable Network Graphics Bitmap mask support	PNG (.png)
	Wireless Bitmap	WBMP (.wbmp)
Image Capture	**Encoder format**	**Supported in file format**
	Joint Photographic Experts Group	JPEG (.jpg)
Video Playback	**Decoder format**	**Supported in file format**
	MPEG-4 Visual Simple Profile	3GPP (.3gp), MP4 (.mp4)
	H.264	3GPP (.3gp), MP4 (.mp4)
	H.263 Profile 0	3GPP (.3gp)

Video Recording	Encoder format	Supported in file format
	- Video H.263 Profile 0, H.264 Baseline Profile - Audio: AAC-LC stereo Sample rate: 48 kHz Bit rate: 128 kbps, AMR-NB	3GPP (.3gp), MP4 (.mp4)
Audio/Video Streaming	Streaming transport	RTSP according to 3GPP™ HTTP streaming
DRM	DRM (Digital Rights Management) — features the rights and copy protection of downloaded content.	OMA DRM 1.0

Synchronisation (OMA DS, EAS, Google Sync™)

OMA Data Synchronisation protocol versions 1.1.2 and 1.2

OMA Data Formats: vCard 2.1, vCalendar 1.0

Microsoft® Exchange ActiveSync® protocol version 2.5

Microsoft® Exchange ActiveSync® protocol version 12.0

Microsoft® Exchange ActiveSync® protocol version 12.1

Google Sync™

Related information:

www.sonymobile.com/developer

Web browser

Browser version	Android 4.0 Browser (Based on WebKit™)
Browser application	Pan & Zoom Landscape/portrait rendering Full page PC rendering Off-line reading Desktop Mode Internet Search Bookmark Synch
Browser compliancy	HTML version 4.0 HTML version 5.0 XHTML Basic version 1.0 XHTML 1.1 CSS 2.0 CSS 2.1 CSS 3.0 JavaScript 1.7/ECMA-script 262 3rd edition DOM 2.0 DOM 3.0 SVG 1.1
Supported Device API	Geo-location API Device Orientation API File Reader API Touch Events API (including multi-touch)
Protocol compliancy	HTTP/1.1 TLS 1.0 and SSL 3.0 Gzip OMA Download 1.0

Related information:

www.sonymobile.com/developer

Memory in Android phones

To use Android phones efficiently, users should be aware of the different types of phone memory. This knowledge is important in order to understand, for example, where music, photos and videos are saved; how many apps can be downloaded from Google Play™; and how photos can be copied to a PC.

Generally, all Android phones share the same basic memory setup. What differs is how much memory is available to you via the different types of memory, and whether your phone uses an external SD card or an internal memory chip. Any information specific to the particular phone model described in this White Paper is noted as such.

Please note that when internal memory is used, the figures you see in the phone information menus may appear to not match with the total amount of stated physical memory. In other words, the figures might not seem to add up. The reason for this is that some sections of the memory may use two memory cells instead of one for every storage unit, in order to secure storage integrity. The need for such "double storage" depends on the type of memory chips used and may therefore differ between products.

Types of memory

The types of memory described below are consistent with the terminology used in Sony mobile phone menus and in other content relating to 2012 Xperia™ phones:

1. **Dynamic Memory** (also known as RAM, or non-persistent memory, because everything in RAM disappears when the power is turned off) is used as "working memory" when the device is actually running, and is shared between the operating system and all active applications and services. Therefore, the amount of Dynamic Memory influences how many applications and operating system services can run at the same time. In Android™ phones, the operating system automatically closes applications and services that are not being used. However, such automatic functionality has limits. For example, if a lower amount of RAM is assigned to a certain release of the operating system, phone speed will be impacted.

   If you experience problems with RAM, for example, if the phone runs slower than usual or if the Home application restarts frequently when you leave an application, you should minimise the use of apps that run all the time. Such apps could include, for example, applications that frequently download social service updates. You could also consider using a static wallpaper instead of a live wallpaper.

   To see which apps and services are currently active, go to **Settings > Applications > Running Services**. You should have at least 50 MB, and ideally 100 MB or more, of free RAM to avoid slowdowns and application restarts.

   You should also be aware that if you update the phone to a later Android release, the load on the built-in Dynamic Memory will increase due to the addition of more features. As a result, the phone may run slower after an update.

All the memory types described below (in sections 2 to 5) together comprise "persistent" memory. What this means is that all data and content stored on these sections of memory will "persist" after the power is turned off (in contrast to the non-persistent RAM). Persistent memory can therefore be used for storing applications, images, music and any other content which can only disappear after being explicitly deleted.

2. **System Memory** (also known as "System partition" or "/system") is used for the Android OS and for most applications that are pre-loaded from the factory. This type of memory is normally locked, and can only be changed through a firmware upgrade. There is usually some free space available in this section of memory. However, since it is locked, you cannot save apps, photos or any other content to this memory. System Memory is reserved for future firmware upgrades, which almost always need more memory than the original firmware. You cannot see or influence the use of this memory.

3. **Phone Memory** (also known as "Data partition" or "/data") is memory type that is used as working memory. It can be compared to the C: drive on a PC or to the startup disk on a Mac. All applications downloaded from Google Play™ or other sources are installed (at least initially) to this type of memory. Some can later be moved to another memory.

   In this type of memory, as with System Memory, all applications have an allocated area which no other applications can access and to where the applications can and usually do save their data (such as phonebook, calendar, notes, and email applications).

   Phone Memory will tend to fill up as a result of normal use, the use of applications saving their data, and you downloading and installing new applications. Therefore, the larger this memory is from the start, the more applications you can download and use.

   If the Phone Memory starts to get full, the phone slows down, and in some cases it might no longer be possible to install more apps. You should always ensure that you have at least 50 MB of free Phone Memory. If not, you should consider removing some apps that you seldom use, or move some applications from the Phone Memory.

   You can see how much Phone Memory is free under **Settings > Storage > Phone memory**. You can also view Phone Memory availability and usage information under **Settings > App**.

4. **Internal Storage/SD card** (also known as "/sdcard") is the memory used for:

   • Content such as photos, movies and music which is added, for example, as a result of the user taking photos with the camera, downloading media files, and performing file transfers.
   • Certain applications to store data in cases where larger amounts of content are involved. For example, applications for games and maps need to store larger files which would not fit in the Phone Memory.
   • Applications that can be moved after installation from the Phone Memory. Note that not all applications can be moved, and in such cases the option to move the particular application will not be available. Typically, apps running as services, apps with widgets, or apps for live wallpapers cannot be moved. Also note that when apps are moved to the Internal Storage or to the SD card memory, a small part of the app will still remain in the Phone Memory.

   This type of memory differs most between different Android phone models. In some models, a large amount of internal memory is built into the phone and is referred to in the user interface as "SD card" memory. In other cases, the phone features a memory card slot and a removable memory card that is bundled with the phone.

   You can see how much Internal Storage is available under **Settings > Storage > Internal storage**.

   In the Xperia™ E dual, the three areas of persistent memory (System Memory, Phone Memory, and Internal Storage), together with some small memory allocations for system operations, share 4 GB of built-in eMMC memory.

   Note that in some products you may find both a large internal memory and a memory card reader slot. However, on the current Android platform, the card reader slot does not work in the same manner in a phone which also features built-in storage as it does in a phone with only a memory card slot and no internal storage. Generally, while you can access content (such as videos, photos and music) on this optional memory card, you cannot in general save anything to the card. Some applications, for example, a backup service application, may still be allowed to do so. In effect, this means that some products feature a fourth type of persistent memory, called "External Card":

5. **External Card** (also known as "/ext_card") is the name for the removable SD memory card in products where there is also Internal Memory and where this Internal Memory is referred to in the phone's user interface as the "sdcard" memory. This External Card memory can generally not be written to from the phone, but it can be used (by the user) to store content from other sources. For example, you can write to this memory from a PC when the phone is connected to a PC and when the External Card is mounted. Some applications on the phone may in some cases, however, also have permissions to write to the External Card.

Backing up data to different memory types

Generally, you should not save photos, videos and other personal content solely on the internal memory of a phone. If something should happen with the hardware, or if the phone is lost or stolen, the data stored on the phone's internal memory is gone forever.

In a phone where an SD card reader is the main memory, it is relatively easy to take the card out and copy all content to a PC or Mac, or to an entertainment device with a memory card slot. In a product featuring Internal Storage as the main memory, it is not possible to physically remove the memory. Instead, any critical or high-value content must either be transferred over a network (mobile or Wi-Fi®) or via a cable. To facilitate the transfer of data via a cable, the Xperia™ E dual supports the Microsoft standard, Media Transfer Protocol (MTP), which makes it possible to easily transfer content back and forth between your phone and a PC. For Apple Mac computers, a special application is available with built-in support for MTP. This application can be downloaded from the Xperia™ E dual support page. Note that you do not need to back up or make a copy of applications that you downloaded from Google Play™. They can normally be downloaded again if you have set up a Google account to work in your phone. You can find the apps which you have purchased under "My apps" in Google Play™, so you will not need to either pay for or search for them again.

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